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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/788,820

02/27/2004

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EXAMINER

FORDE, DELMA ROSA

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/788,820	Applicant(s) BUTTERWORTH ET AL.	
	Examiner DELMA R. FLORES RUIZ	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 07 December 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 – 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicants amended claims 1, 16, 19, 21, the phrase: pressure contact bonded in a manner to remain fixed without adhesive **after the pressure has been removed** the subject matter not properly described in the application as filed, and provide an explanation of your position. The applicants don't have any support in the specification to explain how pressure contact bonded in a manner to remain fixed without adhesive **after the pressure has been removed**. The applicants need to provide support on the specification.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 - 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants amended claims 1, 16, 19, 21, the phrase: pressure contact bonded in a manner to remain fixed without adhesive **after the pressure has been removed** is indefinite and the subject matter not properly described in the application as filed, and provide an explanation of your position. The applicants don't have any support in the specification to explain how pressure contact bonded in a manner to remain fixed without adhesive **after the pressure has been removed**. The applicants need to provide support on the specification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 – 6, 10 – 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Salokatve et al. (6,327,293) in view of Bewley et al. (6,448,642).

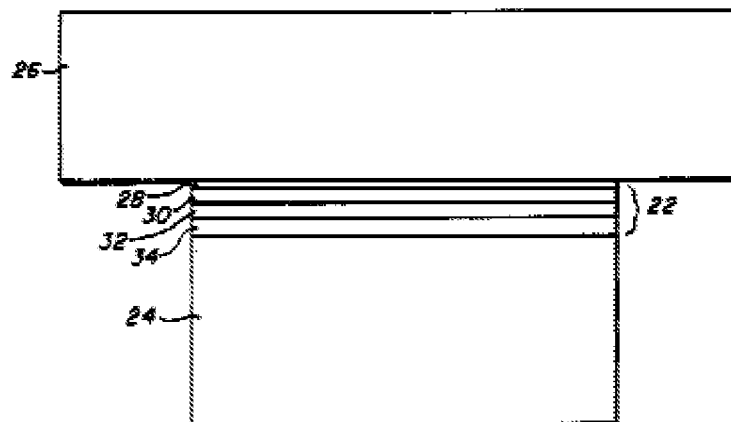
Regarding claim 1, Salokatve discloses in Figures 1 and 2, an optically pumped

semiconductor laser (see Fig. 1, Character 10) component, comprising: a multilayer structure including a mirror (see Fig. 1 Character 14) structure surmounted by a multilayer gain-structure (see Figs. 1, 2, Character 16); and at least a first heat conducting element (see Fig. 1, Character 32) having a high thermal conductivity and having first and second opposite surfaces, said heat-conducting element (see Fig. 1, Character 32) via said first surface thereof to one of said mirror structure (see Fig. 1, Character 14) and said gain-structure (see Fig. 1, Character 16) and (Column 4, Lines 50 – 54).

Salokatve discloses the claimed invention except for pressure contact bonded in a fixed manner without adhesive. However, it is well known in the art to apply the pressure contact bonded without adhesive as disclosed by Bewley in Column 7, Lines 34 – 62. Therefore, it would have been obvious to a person having ordinary skill in the art to apply the well known as suggested by Bewley to the laser of Salokatve, because it will be contrast epitaxial-side-up or epitaxial-side-down mounting arrangement in which the thermal contact relies on the solder bond between the two metallized surface and provides an excellent thermal bond in a configuration that is simple, requires minimal processing, and eliminates the conventional solder layers which can add thermal resistance to the path from the device to the heat sink, Column 7, Lines 34 – 62 of Bewley.

Regarding claim 2, Bewley discloses thermal conductivity of said first heat

conducting element is greater than the thermal conductivity (Column 1, Lines 27 – 30 and Column 3, Lines 49 – 56).



Bewley shown Figure 2

Regarding claim 3, Salokatve discloses in Figures 1 and 2, said first heat conducting element (see Fig. 1, Character 32) is contact bonded (see Fig. 1, Character 31) to say mirror structure (see Fig. 1, Character 14).

Regarding claims 4 – 6, Salokatve discloses in Figure 2, mirror structure (see Fig. 2, Character 14) is a multilayer semiconductor and dielectric structure (see Fig. 2, Characters 52 and 54) and mirror structure includes a metal layer and one or more dielectric layers (Column 3, Lines 50 – 54 and Column 6, Lines 47 - 67).

Salokatve shown Figure 1

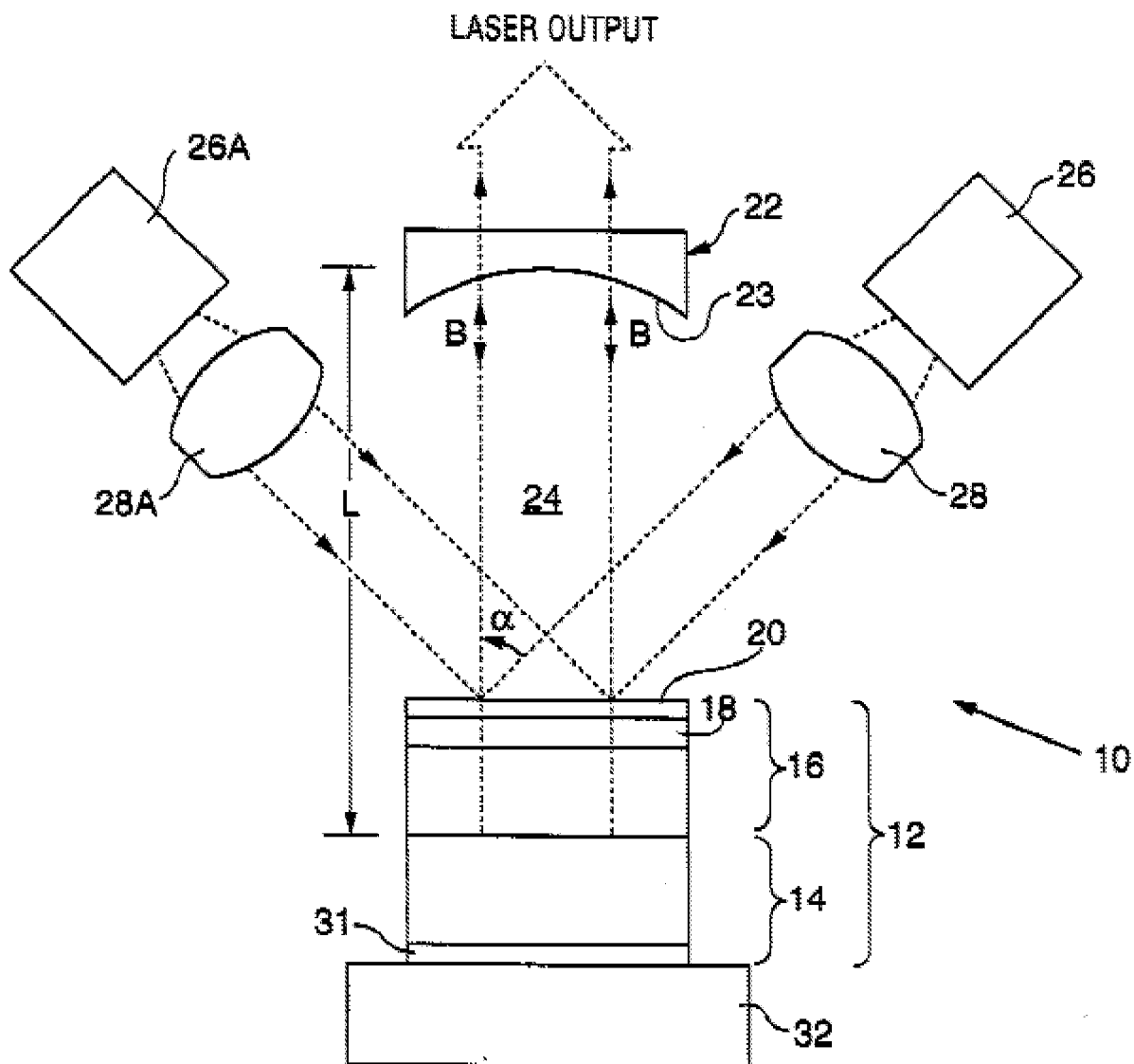


FIG. 1

Regarding claim 10, Salokatve discloses in Figures 1 and 2, said first heat-conducting element (see Fig. 1, Character 32) is a diamond element (Column 7, Lines 30 – 31).

Regarding claim 3, Salokatve discloses in Figures 1 and 2, said first heat conducting element (see Fig. 1, Character 32) is contact bonded (see Fig. 1, Character 31) to said mirror structure (see Fig. 1, Character 14).

Regarding claims 4 – 6, Salokatve discloses in Figure 2, mirror structure (see Fig. 2, Character 14) is a multilayer semiconductor and dielectric structure (see Fig. 2, Characters 52 and 54) and mirror structure includes a metal layer and one or more dielectric layers (Column 3, Lines 50 – 54 and Column 6, Lines 47 - 67).

Regarding claim 10, Salokatve discloses in Figures 1 and 2, said first heat-conducting element (see Fig. 1, Character 32) is a diamond element (Column 7, Lines 30 – 31).

Regarding claim 11, Salokatve discloses in Figures 1 and 2, said second surface of said first heat-conducting element is in thermal contact with a heat sink (Column 4, Lines 50 – 54).

Regarding claim 13, Salokatve discloses in Figures 1 and 2, wherein said first surface of said first heat-conducting element (see Fig. 1, Character 32) is contact bonded to said gain-structure (see Fig. 1, Character 16).

Claim 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Salokatve et al. (6,327,293) in view of Bewley et al. (6,448,642) further in view Zayhowski (5,386,427).

Regarding claim 9, Salokatve et al in view of Bewley et al. discloses the claimed invention except for heat conducting element is one of diamond and sapphire element. However, it is well know in the art to apply the heat-conducting element is one of diamond and sapphire element as discloses by Zayhowski in Column 3, Lines 61 – 67. Therefore, it would have been obvious to a person having ordinary skill in the art to apply the well known heat conducting element is one of diamond and sapphire element as suggested by Zayhowski to the laser of Salokatve in view of Bewley, because it is a good thermally conductive materials see Column 3, Lines 61 – 67 of Zayhowski.

Claims 7 – 8, 12 and 14, are rejected under 35 U.S.C. 103(a) as being unpatentable over Salokatve et al. (6,327,293) in view of Bewley et al. (6,448,642). further in view of Raymond et al. (6,393,038).

Regarding claims 7 – 8, 12 and 14, Salokatve in view of Bewley discloses the claimed invention except for second heat conducting element and heat sink is a cooper heat sink. However, it is well know in the art to apply the second heat-conducting element as discloses by Raymond in Figure 1, character 30 and Column 7, Lines 29 –

47. Therefore, it would have been obvious to a person having ordinary skill in the art to apply the well-known second heat-conducting element as suggested by Raymond to the optically pumped semiconductor laser of Salokatve in view of Bewley, because it will use second heat-conducting element (e.g. comprising copper) for temperature control and cooling see Column 7, Lines 30 – 32 of Raymond.

Salokatve discloses the claimed invention except for pressure contact bonded in a fixed manner without adhesive. However, it is well known in the art to apply the pressure contact bonded without adhesive as disclosed by Bewley in Column 7, Lines 34 – 62. Therefore, it would have been obvious to a person having ordinary skill in the art to apply the well known as suggested by Bewley to the laser of Salokatve, because it will be contrast epitaxial-side-up or epitaxial-side-down mounting arrangement in which the thermal contact relies on the solder bond between the two metallized surface and provides an excellent thermal bond in a configuration that is simple, requires minimal processing, and eliminates the conventional solder layers which can add thermal resistance to the path from the device to the heat sink, Column 7, Lines 34 – 62 of Bewley.

Claims 15, are rejected under 35 U.S.C. 103(a) as being unpatentable over Salokatve et al. (6,327,293) in view of Bewley et al. (6,448,642) further in view of Raymond et al. (6,393,038) further in view Zayhowski (5,386,427).

Regarding claim 15, Salokatve in view of Bewley further in view of Raymond

discloses the claimed invention except for heat conducting element is one of diamond and sapphire element. However, it is well known in the art to apply the heat conducting element is one of diamond and sapphire element as disclosed by Zayhowski in Column 3, Lines 61 – 67. Therefore, it would have been obvious to a person having ordinary skill in the art to apply the well known heat conducting element is one of diamond and sapphire element as suggested by Zayhowski to the laser of Salokatve in view of Bewley further in view of Raymond, because it is a good thermally conductive material see Column 3, Lines 61 – 67 of Zayhowski.

Claims 16 – 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Salokatve et al. (6,327,293) in view of Bewley et al. (6,448,642) further in view of Pinneo (6,919,525).

Regarding claim 16 – 21, Salokatve discloses in Figures 1 and 2, an optically pumped semiconductor laser (see Fig. 1, Character 10) component, comprising: a multilayer structure including a mirror (see Fig. 1 Character 14) structure surmounted by a multilayer gain-structure (see Figs. 1, 2, Character 16).

Salokatve discloses the claimed invention except for pressure contact bonded in a fixed manner without adhesive. However, it is well known in the art to apply the pressure contact bonded without adhesive as disclosed by Bewley in Column 7,

Lines 34 – 62. Therefore, it would have been obvious to a person having ordinary skill in the art to apply the well known as suggested by Bewley to the laser of Salokatve, because it will be contrast epitaxial-side-up or epitaxial-side-down mounting arrangement in which the thermal contact relies on the solder bond between the two metallized surface and provides an excellent thermal bond in a configuration that is simple, requires minimal processing, and eliminates the conventional solder layers which can add thermal resistance to the path from the device to the heat sink, Column 7, Lines 34 – 62 of Bewley.

Salokatve discloses the claimed invention except for heat spreader element and heat spreader element is formed for CVD diamond. However, it is well know in the art to apply the heat spreader element and heat spreader element is formed for CVD diamond as discloses by Pinneo in Column 4, Lines 18 – 25. Therefore, it would have been obvious to a person having ordinary skill in the art to apply the well know heat spreader element and heat spreader element is formed for CVD diamond as suggested by Pinneo to the optically pumped semiconductor laser of Salokatve in view or Bewley, because it's routinely sold for commercial applications ranging from cutting tools to heat spreaders. All diamond CVD processes to date have been characterized by very low process efficiency in terms of the amount of diamond produced in response to consumption of energy and synthesis materials. There has been a long-felt need within the CVD diamond industry to improve diamond CVD process efficiencies. This long felt need has given rise to vigorous prior but unsuccessful efforts to achieve significantly

higher process efficiencies see Column 4, Lines 18 – 36 of Pinneo.

Response to Arguments

Applicant's arguments filed 12/07/2007 have been fully considered but they are not persuasive. Applicants amended claims 1, 16, 19, 21, the phrase: pressure contact bonded in a manner to remain fixed without adhesive **after the pressure has been removed** the subject matter not properly described in the application as filed, and provide an explanation of your position. The applicants don't have any support in the specification to explain how pressure contact bonded in a manner to remain fixed without adhesive **after the pressure has been removed**. The applicants need to provide support on the specification.

Applicant argues the prior art lacks: On page 7 second paragraph of remarks filed 12/07/2007 said: As noted by Applicants' counsel, the exact words added to the claims are not expressly present in the application. However, one skilled in the art would be quite familiar with the results of optical contact bonding ("***Standard optical contacting methods are used, well known in the industry***" page 10, line 18). Further, this same paragraph teaches that the elements should be annealed at high temperature. As noted above, annealing improves the shear strength of the bond. If the bond were not fixed, there would be no need to anneal the bond. The examiner disagrees with the applicant arguments since the page 10, Lines 13 – 24, said: *It is*

preferable when optically contacting a diamond (CVD, natural or type IIa-synthetic) or any other highly thermally conductive heat spreader material to a semiconductor epitaxial layer structure, that the surfaces of both the layer structure and the heat spreader be very clean and very flat, preferably flatter than 0.2 waves at 635 nm. Standard optical contacting methods are used, well known in the industry. Regarding cleanliness, it is preferable that contacting be carried out on a class 100 clean bench and that surfaces be finally cleaned with an organic solvent such as acetone, methanol and iso-propanol. Once the heat spreader and the semiconductor chip are clean, one edge of the semiconductor chip is pressed against the heat spreader and the two surfaces are brought into contact with pressure. This usually requires multiple attempts of recleaning and contacting. Once a full surface optical contact has been made, the contacted, assembled structure is annealed at temperatures between 25 100°C and 350°C. The examiner read very carefully page 10, lines 13 - 24 and don't have any support in the specification to explain how pressure contact bonded in a manner to remain fixed without adhesive **after the pressure has been removed**. The examiner believe the applicant accept the *standard optical contacting methods are used, well known in the industry* and is not new on the industry. The applicant need to explain what exactly is well known in the industry and what is new and provide an explanation of your position

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Delma R. Flores Ruiz whose telephone number is (571) 272-1940. The examiner can normally be reached on M - F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Min Sun Harvey can be reached on (571) -272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Delma R. Flores Ruiz/

Examiner, Art Unit 2828

/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828